

# Memorandum

To: ALL DISTRICT/REGION DIRECTORS  
ALL DISTRICT/REGION DIVISION CHIEFS  
ALL PROGRAM/PROJECT MANAGEMENT  
ALL CONSTRUCTION MANAGEMENT  
ALL DESIGN MANAGEMENT

Date : July 31, 1997

File No. :

From: DEPARTMENT OF TRANSPORTATION  
DESIGN AND LOCAL PROGRAMS  
MAIL STATION #28

Subject: Constructability Reviews

Last December the "PS&E/Constructability Team", which was jointly sponsored by Design & Local Programs, the Construction Program and included representatives from the Districts, ESC and FHWA, recommended several process improvements. These recommendations are aimed at improving overall constructability in an effort to reduce contract change orders and delay claims. One of the Team's more significant recommendations calls for the implementation of a formal Constructability Review Process for all major capital outlay projects. The details of this process are outlined on Attachment A.

The Team is currently working with District 8 to implement the use of a formal Constructability Review Process, on a pilot basis, for a number of projects of varying size and type. District 12 has been successfully using a version of the Constructability Review Process since 1991, and the State of Washington is actively working to implement Constructability Review Processes within their organization.

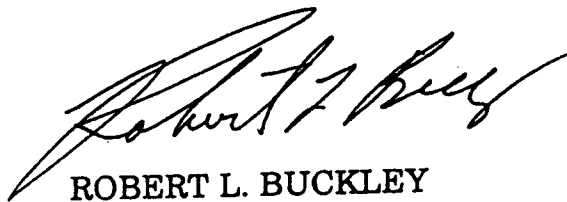
[ It appears that the value of this tool in preventing construction problems outweighs the effort required to implement therefore Districts and Regions shall utilize this process for all projects with an estimated escalated construction cost of \$25 million or more. These will typically be the more complex projects requiring a comprehensive "Level 1" review, as described on Attachment A. Exceptions to conducting constructability reviews are to be approved by the District or Region Director. Projects already in the "pipeline" should be reviewed at the next Constructability Review stage. ]

*Superseded  
by 5/20/98 Memo*

When conducting Constructability Reviews, the Headquarters Project Development Coordinator and Construction Reviewer may be helpful on the review team.

All District/Region Directors  
All District/Region Division Chiefs  
All Program/Project Management  
All Construction Management  
All Design Management  
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If you have any questions regarding the Constructability Review Process or need help with implementation, please call Jim De Luca, of my staff, at Calnet 453-4067. If you have any suggestions for improvements or changes needed to make this tool more useful, please advise Jim or the Project Development Coordinator assigned to your District.



ROBERT L. BUCKLEY  
Program Manager  
Design and Local Programs

Attachment

JDeLuca:dlt  
bcc:  
BColeman  
BGauger  
JDeLuca  
OPPD File

## **ATTACHMENT A**

### **Constructability Review Process**

#### **Process Overview:**

The formal Constructability Review Process is an iterative, multidisciplinary review at defined stages of the project development process. It is appropriate to vary the number of reviews based on the size and complexity of the individual project. A “Level 1” Constructability Review, which includes reviews at the Project Initiation Document (PID) stage and 30%, 60%, and 95% design stages is appropriate for the following types of projects:

- Large, complex roadway/facility improvements (including new construction, widening, or realignment projects with significant staging and traffic handling requirements).
- Complex interchange construction or modifications.
- Large structure projects with complex or very high cost features.
- Large rehabilitation projects which include widening, major replacements of structures/drainage features, or significant utility involvement.

A “Level 2” Constructability Review which includes a PID stage and 30% and 95% design reviews is appropriate for:

- Less complex roadway/facility projects (including widening projects with minimal staging/traffic handling requirements).
- Less complex structure or interchange projects.
- Most rehabilitation projects which include structure rehabilitation, minor widening, drainage, or safety improvements.

A “Level 3” Constructability Review which includes a PID stage and 95% design review is appropriate for other simple projects such as:

- Capital Preventative Maintenance (CAPM) overlay projects.
- Most non-complex Soundwall projects.

The PID review involves the review of the Draft: PSR, PSSR, or other initiation document, prior to programming of the project. It is a “fatal flaw”-type review to assure that all alternatives are constructable based on the available level of detail. It includes a review of the proposed project workplan and schedule.

The 30% design review generally takes place after “project approval” (approval of the Final Environmental Document and/or Project Report Project) at the “Geometric Base Map” stage. It includes the review of traffic control, staging and right-of-way requirements. Available hydraulics and/or geotechnical information is included in this review as are any environmental restrictions or mitigation requirements. The review addresses any design modifications since the PID review.

While there is no formal constructability review step proposed during the Environmental Document (ED) stage, it would be prudent to consult with the Constructability Review team members before finalizing the ED. This is particularly important during consultation with environmental permitting agencies which may establish construction windows or place specific mitigation requirements on the project.

The 60% design review is a more detailed review of final project geometrics, completed earthwork/grading plans, drainage layout and preliminary quantity calculations. Final right-of-way requirements are reviewed as are traffic control, construction staging, and permitting agency commitments. The review addresses any design modifications or schedule or resource changes since the previous review.

The 95% design review incorporates the project Safety Reviews and builds upon prior reviews. It includes a check of final quantities, special provisions (including number of contract working days) and project cost estimate.

Each level Constructability Review is conducted such that project information (reports, plans, etc.) are distributed to each team member at least two weeks prior to the Constructability Review meeting. Team members conduct a detailed independent review, using a checklist appropriate for their functional area, and compile comments which are brought to the Constructability Review meeting. These checklists are signed by the individual Functional Managers, for their respective Division Chiefs, to assure accountability. (Attached are functional checklists to assist each functional unit in completing their reviews).

All comments are discussed at the Constructability Review meeting, which may take up to four hours for each Constructability Review level. The goal is to resolve all comments during the meeting. Any comments which cannot be resolved during the meeting are assigned to a review team member who is responsible for prompt follow up by a specific date. The Project Engineer and/or Project Manager has the overall responsibility to assure that all comments are adequately addressed, as described in "Implementation Responsibilities", below.

### **Resources:**

To assure that functional unit staff are available to conduct these constructability reviews, the Project Manager negotiates with each Functional Manager at the PID stage and includes sufficient time and resources in the Project Workplan. This means that more resources may need expended during the early stages of the project development process. However the resources required to conduct the Constructability Reviews should be more than offset by the savings in capital support resource which are currently going towards negotiating Contract Change Orders (CCOs) and resolving claims.

### **Implementation Responsibilities:**

The Project Manager is responsible for selecting the appropriate Constructability Review level, assuring that sufficient time and resources are allocated for the Constructability Review in the Project Workplan and that the Constructability Reviews take place at the established times. The Project Engineer is responsible for distributing the project information to the appropriate functional units for each Constructability Review level. The Project Engineer, in conjunction with the Project Manager, schedules and coordinates the Constructability Review meetings. The Project Manager also assures that all comments are adequately addressed in the project. If a comment is not addressed, the Project Engineer, with the concurrence of the Project Manager, responds to the functional unit which generated the comment, explaining why it was not addressed.

Functional Managers involved in the project are responsible for actively participating in the Constructability Review Process and for providing thorough timely comments. Typical functional involvement at each Constructability Review level include representatives from: Design, Construction, Environmental, Maintenance, Traffic, Right of Way, and Structures. At the early Constructability Review levels, it may be appropriate to include regulatory (permitting) agencies or local agency staff. Later Constructability Review levels may include representatives from Materials/Geotechnical (ESC), Hydraulics or Permits. Headquarters representation for each Constructability Review should include the Project Development Coordinator and Construction Reviewer, particularly for the larger, more complex "Level 1" projects.

# CALTRANS PS&E/CONSTRUCTABILITY REVIEW CHECKLIST

Project Information: - Co.-Rte.-KP: \_\_\_\_\_ District/EA: \_\_\_\_\_

Reviewed By: \_\_\_\_\_ Date: \_\_\_\_\_ Functional Unit: **DESIGN**

*I certify that a thorough and complete constructability review has been performed by my staff.*

Signature of Functional Manager _____	Date _____	PS&E Milestone		
Key Constructability Issues		30%	60%	95%
Traffic Management Plan has been developed, if required		X	X	
Preliminary structures studies performed		X		
Preliminary materials investigation conducted		X	X	
Drainage mitigation measures proposed		X	X	
Development of workable construction staging plans complete and shown on plans		X	X	
Specifications for traffic handling & lane closures are included				X
Conflicts with on-going projects identified		X		
Construction easements adequate		X	X	X
Identification and avoidance of section 4(f) properties		X		
All necessary permits to construct identified/acquired		X	X	X
Adequate access for residents & businesses in areas under construction		X	X	
Necessary construction details covered in project plans				X
Work shown on plans is adequately described in Std Specs or SSPs				X
Utility plans conform to Caltrans policy on high & low risk facilities				X
Hazardous Waste sites identified and mitigation plan developed		X	X	X
Proposed "work-arounds", if needed, are clearly defined		X	X	X
Drainage interface with adjoining projects			X	
Consistency between roadway and structure plans			X	X
Project Materials Report recommendations for :				
Embankment foundations and settlement estimates		X	X	
Slope Design		X	X	
Subsurface/groundwater control		X	X	
Railroad involvement identified		X	X	X
Impacts of construction windows required by environmental Resource Agencies		X	X	X
Previous suggestions/corrections addressed		X	X	X

# CALTRANS PS&E/CONSTRUCTABILITY REVIEW CHECKLIST

Project Information: - Co.-Rte.-KP: \_\_\_\_\_ District/EA: \_\_\_\_\_  
Reviewed By: \_\_\_\_\_ Date: \_\_\_\_\_ Functional Unit: **TRAFFIC OPNS./**  
**TRAFFICMGT.**

*I certify that a thorough and complete constructability review has been performed by my staff:*

**Signature of Functional Manager**

Date \_\_\_\_\_

## PS&E Milestone

[illegible]

# CALTRANS PS&E/CONSTRUCTABILITY REVIEW CHECKLIST

**Project Information: - Co.-Rte.-KP: \_\_\_\_\_ District/EA: \_\_\_\_\_**

Reviewed By: \_\_\_\_\_ Date: \_\_\_\_\_ Functional Unit: **TRAFFIC DESIGN/**  
**ELECTRICAL DESIGN.**

*I certify that a thorough and complete constructability review has been performed by my staff:*

**Signature of Functional Manager**

Date \_\_\_\_\_

## PS&E Milestone

[illegible]

# CALTRANS PS&E/CONSTRUCTABILITY REVIEW CHECKLIST

Project Information: - Co.-Rte.-KP: \_\_\_\_\_ District/EA: \_\_\_\_\_  
 Reviewed By: \_\_\_\_\_ Date: \_\_\_\_\_ Functional Unit: **CONSTRUCTION**  
*I certify that a thorough and complete constructability review has been performed by my staff:*

**Signature of Functional Manager**

Date \_\_\_\_\_

## PS&E Milestone

[illegible]

# CALTRANS PS&E/CONSTRUCTABILITY REVIEW CHECKLIST

Project Information: - Co.-Rte.-KP: \_\_\_\_\_ District/EA: \_\_\_\_\_  
 Reviewed By: \_\_\_\_\_ Date: \_\_\_\_\_ Functional Unit: **DISTRICT OFFICE ENGR.**  
*I certify that a thorough and complete constructability review has been performed by my staff:*

Signature of Functional Manager	Date	PS&E Milestone		
Key Constructability Issues		30%	60%	95%
All items of work shown on Plans specified in SSPs and match pay items in BEES. Description and unit of measure are consistent in PS&E.				X
Railroad involvement on plans resolved.			X	X
Cross sections are developed as required.				X
Standard Plans Lists are complete and accurate.				X
Typical cross sections includes existing conditions.		X	X	X
First Layout sheet contains legends, symbols abbreviations not shown on Standard Plans. All necessary exist facilities shown in dropout.				X
Construction Details are complete.				X
Drainage profiles included as required. Alternative pipe culvert table included.				X
Detours, Traffic Handling plans and stage construction plans are included as required.			X	X
Summary of Quantities are tabulated & summarized correctly.				X
Utility Plans complete & high risk utilities identified & located on plans.		X	X	X
Log of Test Borings included for all retaining and soundwall projects.				X
Number of working days sufficient for the type of work.				X
Liquidated damages calculated per project's complexity.				X
Lane closure charts are included.				X
SSPs specify all work to be done in Plans & contract pay items in BEES.				X
All SSPs have necessary measurement and payment clauses				X
All SSPs related to obstructions (including high risk facilities) are incl.				X
Railroad clauses provided.				X
All permits are obtained & requirements needed are incorporated in the PS&E.		X	X	X
Supplemental Funds for Maintain Traffic included.				X
Environmentally Sensitive Areas (ESAs) are identified on plans and included in SSPs.		X	X	X
Storm Water Pollution Prevention Plan (SWPPP) issues addressed			X	X
Previous suggestions/corrections addressed		X	X	X

# CALTRANS PS&E/CONSTRUCTABILITY REVIEW CHECKLIST

**Project Information: - Co.-Rte.-KP: \_\_\_\_\_ District/EA: \_\_\_\_\_**

Reviewed By: \_\_\_\_\_ Date: \_\_\_\_\_ Functional Unit: LANDSCAPE ARCH.

*I certify that a thorough and complete constructability review has been performed by my staff:*

[illegible]

# CALTRANS PS&E/CONSTRUCTABILITY REVIEW CHECKLIST

**Project Information: - Co.-Rte.-KP: \_\_\_\_\_ District/EA: \_\_\_\_\_**

Reviewed By: \_\_\_\_\_ Date: \_\_\_\_\_ Functional Unit: **MATLS & GEOTECH.**

*I certify that a thorough and complete constructability review has been performed by my staff:*

**Signature of Functional Manager**

Date \_\_\_\_\_

**PS&E Milestone**

[illegible]

# CALTRANS PS&E/CONSTRUCTABILITY REVIEW CHECKLIST

**Project Information: - Co.-Rte.-KP:** \_\_\_\_\_ **District/EA:** \_\_\_\_\_

Reviewed By: \_\_\_\_\_ Date: \_\_\_\_\_ Functional Unit: **ENVIRONMENTAL**

*I certify that a thorough and complete constructability review has been performed by my staff:*

**Signature of Functional Manager**

Date \_\_\_\_\_

## PS&E Milestone

[illegible]

## CALTRANS PS&E/CONSTRUCTABILITY REVIEW CHECKLIST

**Project Information: - Co.-Rte.-KP: \_\_\_\_\_ District/EA: \_\_\_\_\_**

Reviewed By: \_\_\_\_\_ Date: \_\_\_\_\_ Functional Unit: MAINTENANCE

*I certify that a thorough and complete constructability review has been performed by my staff:*

**Signature of Functional Manager**

Date \_\_\_\_\_

## PS&E Milestone

[illegible]

# CALTRANS PS&E/CONSTRUCTABILITY REVIEW CHECKLIST

**Project Information: - Co.-Rte.-KP:** \_\_\_\_\_ **District/EA:** \_\_\_\_\_

Reviewed By: \_\_\_\_\_ Date: \_\_\_\_\_ Functional Unit: **HAZARDOUS WASTE**

*I certify that a thorough and complete constructability review has been performed by my staff:*

**Signature of Functional Manager**

**Date**

## PS&E Milestone

[illegible]

# CALTRANS PS&E/CONSTRUCTABILITY REVIEW CHECKLIST

Project Information: - Co.-Rte.-KP: \_\_\_\_\_ District/EA: \_\_\_\_\_  
 Reviewed By: \_\_\_\_\_ Date: \_\_\_\_\_ Functional Unit: **HYDRAULICS**  
*I certify that a thorough and complete constructability review has been performed by my staff:*

Signature of Functional Manager _____	Date _____	PS&E Milestone		
Key Constructability Issues		30%	60%	95%
Approved preliminary drainage report		X		
Approved vertical and horizontal alignment		X		
Typical cross-section		X		
Preliminary drainage plans		X		
Maintainable facility with sufficient right-of-way and/or drainage easements		X		
Utilization of correct erosion factors for slope soil loss, stream aggradation/degradation outlet velocities		X		
Subsurface conditions studied adequately including groundwater control		X		
Flow diversion/connection approved by appropriate agencies			X	
Drainage for construction staging			X	
Drainage interface with adjoining projects or future projects			X	
Drainage plans, profiles and details are sufficient including special designs for large underground structures			X	
Grading plans			X	
Soundwall and/or retaining wall drainage plans adequate			X	
Bridge and/or pumping plant plans included			X	
Erosion Control plans complete and sufficient			X	
Pipe jacking method appropriate for given site conditions			X	
Materials report recommendations for backfilling adequate			X	
Channel lining adequate for conditions and availability of source			X	
Drainage is consistent with roadway and structure plans			X	X
Drainage quantity estimates accurate			X	X
Drainage specifications adequate				X
All required permits obtained including cooperative agreements				X
Floodplan issues resolve (ie, impact on base flood elevation)				X
Computability of project with future projects				X
Previous suggestions/corrections addressed		X	X	X

# CALTRANS PS&E/CONSTRUCTABILITY REVIEW CHECKLIST

**Project Information: - Co.-Rte.-KP: \_\_\_\_\_ District/EA: \_\_\_\_\_**

Reviewed By: \_\_\_\_\_ Date: \_\_\_\_\_ Functional Unit: **HYDROLOGY**

*I certify that a thorough and complete constructability review has been performed by my staff:*

**Signature of Functional Manager**

Date

## PS&E Milestone

[illegible]

## CALTRANS PS&E/CONSTRUCTABILITY REVIEW CHECKLIST

**Project Information: - Co.-Rte.-KP: \_\_\_\_\_ District/EA: \_\_\_\_\_**

Reviewed By: \_\_\_\_\_ Date: \_\_\_\_\_ Functional Unit: RIGHT-OF-WAY

*I certify that a thorough and complete constructability review has been performed by my staff:*

**Signature of Functional Manager**

Date \_\_\_\_\_

## PS&E Milestone

[illegible]

# CALTRANS PS&E/CONSTRUCTABILITY REVIEW CHECKLIST

**Project Information: - Co.-Rte.-KP:** \_\_\_\_\_ **District/EA:** \_\_\_\_\_

Reviewed By: \_\_\_\_\_ Date: \_\_\_\_\_ Functional Unit: **SURVEYS**

*I certify that a thorough and complete constructability review has been performed by my staff:*

**Signature of Functional Manager**

Date \_\_\_\_\_

**PS&E Milestone**

[illegible]

## CALTRANS PS&E/CONSTRUCTABILITY REVIEW CHECKLIST

**Project Information: - Co.-Rte.-KP: \_\_\_\_\_ District/EA: \_\_\_\_\_**

Reviewed By: \_\_\_\_\_ Date: \_\_\_\_\_ Functional Unit: \_\_\_\_\_

*I certify that a thorough and complete constructability review has been performed by my staff:*

**Signature of Functional Manager**

**Date**[illegible]